REMARKS

I. Status of Claims

Claims 1-16 are pending in the application.

Claims 1-2 and 13-16 are amended. Support for the amendments can be found in the present specification, for example, at Figs. 2 and 6 and the paragraph bridging pages 11 and 12.

No new matter is added. Accordingly, entry of the Amendment is respectfully requested.

II. Response to Claim Rejection Under 35 U.S.C. § 102(b)

Claims 1-16 are rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Cohen et al. (U.S. Patent No. 5,993,697).

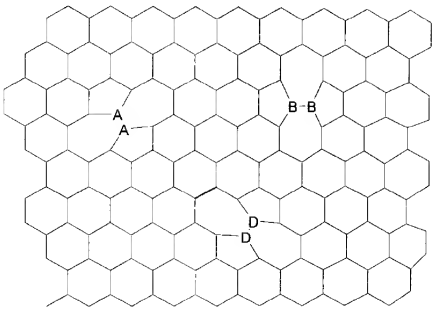
Amended claims 1 and 2 recite, in part, that the vacancy included in said graphite-like layered material is formed in the shape of a diatomic vacancy or a monoatomic vacancy by detaching two adjacent atoms or one atom away from the graphite-like layered material.

Cohen teaches a process for preparing pentaheptite that is essentially based upon the simplest possible way of tiling a plane with a periodic network of pentagons and heptagons, as show in Fig. 1 of Cohen, wherein each pentagon is adjacent to one pentagon and four heptagons, and each heptagon is adjacent to four pentagons and three heptagons. In the periodic network of pentagons and heptagons, as show in Fig. 1 of Cohen, two adjacent five-membered rings, "pentagons", are periodically formed in the same orientation.

In contrast, the process of the present invention is directed to the preparation of a reactive graphite-like layered material, in which defect sites of Stone-Wales type composed of two pentagons and two heptagons, as shown in Fig. 5 of the present specification, or defect sites

formed in nine-membered ring shape, as shown in Fig. 6 of the present specification, are dispersedly embedded in the hexagonal network of graphite-like layered material. In fact, a periodic network of pentagons and heptagons is not constructed with the defect sites that are prepared by the process of the present invention.

For instance, the defect sites of Stone-Wales type formed in the process of the present invention that are embedded in the hexagonal network of graphite-like layered material may independently have the following three different orientations, A-A, B-B and D-D, as shown below. The orientation of the site indicated by A-A is quite different from the orientations of the site indicated by B-B or of the site indicted by D-D.



Further, as the defect sites of Stone-Wales type, as shown in Fig. 5 of the present specification, or defect sites formed in nine-membered ring shape, as shown in Fig. 6 of the present specification, are embedded in the hexagonal network of graphite-like layered material, these defect sites are metastable but more reactive than the original hexagonal conformation.

Indeed, the defect sites that are embedded in the hexagonal network of graphite-like layered material retain somewhat distorted ring shape in comparison with the totally relaxed ring shape of the periodic network of pentagons and heptagons, as shown in Fig. 1 of Cohen.

Therefore, Cohen fails to teach such a process for preparing a reactive graphite-like layered material, in which a periodic network of pentagons and heptagons is not constructed.

Furthermore, Cohen teaches a process for constructing the periodic network of pentagons and heptagons, as shown in Fig. 1 of Cohen, whereby:

graphite sheets in the form of hexagonal network are used as a starting material;

electron beam is directed along the plane of the graphite layers;

electron beam imparts energy to two adjacent carbon atoms in the lattice causing the two adjacent carbon atoms to rotate in-plane and convert a region of four hexagons into a region of two pentagons and two heptagons, as illustrated in Fig. 3 of Cohen, without destroying the material by ejecting atoms from it; and

the thus-resulted regions of two pentagons and two heptagons that are formed in the network shape are subsequently relaxed into the periodic network of pentagons and heptagons without any treatment of annealing.

Cohen describes that "[t]he inventive pentapheptite was designed by rotating selected bonds in hexagonal graphite with the aid of computer modeling." See column 7, lines 36-39. In the calculation with the aid of computer modeling, the anneal was used in place of irradiation of electron beam to replace the atomic positions from the original hexagonal configuration of the

graphite. However, Cohen by no means employs thermal annealing treatment after the step of irradiation of electron beam.

In fact, Cohen further describes that "[t]he fact that the pentaheptite was shown to be stable during the 2500 K anneal provides further evidence of the stability of the structure." See column 8, lines 47-52.

As the rotation of the bond is carried out without destroying the material by ejecting atoms from it, no vacancy caused by ejecting atoms from it is formed by the electron beam during bond rotation. Thus, no introducing site, as shown in Fig. 3 of the present application, is formed in the process of Cohen.

In the process of Cohen, the conversion of a region of four hexagons into a region of two pentagons and two heptagons is made by bond rotation due to the in-plane rearrangement of the positions of two adjacent carbon atoms, as illustrated in Fig. 3 of Cohen. Accordingly, the process of Cohen is quite different from the process of the present invention, in which the vacancy formed in the graphite-like layered material is formed in the shape of diatomic vacancy or monoatomic vacancy by detaching two adjacent atoms or one atom away from the graphite-like layered material.

In view of the above, Applicants respectfully submit that Cohen does not teach or suggest all of the limitations of independent claims 1 and 2. Claims 3-16 are also patentable over Cohen, at least by virtue of their dependence from claims 1 and 2. Therefore, reconsideration and withdrawal of the § 102(b) rejection of the present claims is respectfully requested.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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Respectfully submitted,

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